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ABSTRACT

The development of a prototype system is described which merges the strengths of computer assisted instruction, data gathering, interactive learning, individualized instruction, and the motion in color, and audio features of television. Creation of the prototype system will allow testing of both TV and interactive CAI/TV strategies in auditory and speech therapy. (Author/CMV)

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A DESCRIPTION OF A PROTOTYPE SYSTEM AT NTID WHICH MERGES COMPUTER ASSISTED INSTRUCTION AND INSTRUCTIONAL TELEVISION.

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National Technical Institute for the Deaf

January 1978

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ABSTRACT

This report describes a prototype system which was developed at NTID. The system merges the strengths of computer assisted instruction, data gathering, interactive learning, individualized instruction and the color motion/audio features of television. The rationale for the development of this system as well as a description are included in this report.

Problem

Research data suggests that a combination of student interaction (active learning) when merged with motion and audio may provide significant instructional gains in areas of therapeutic Audiology and Speech Pathology. Instruction which is not now possible could be provided. Though systems exist which demonstrate the effectiveness of each strategy, no system existed which allowed the exploration of all these features in a single system. The resultant prototype was designed to test the efficacy of such an instrument.

Specifications

The specifications included features which will be required for instruction as well as research of the instructional process for Auditory and Speech Therapy. The elements specified in the proposed system were: audio, motion in color (with or without audio), random accessibility, quick rewind, ability to individualize, capacity for active student participation (interaction) and data gathering (summary and printed output). In addition, it was requested that the system be basically portable and reproducible (without research components) at a relatively low cost.

Feasibility

The first question addressed was "Is such a system feasible?" Extensive exploration utilizing expertise in television, computers, electronics, instruction and CAI indicated that the state of the art was such that the system could be built. A search showed that no such system was now in existence. The task began as a design of the prototype system to meet instructional specifications.

Audio

The audio feature was designated as a primary need for auditory training. Speech training specified audio as desirable also.

Motion - Color

Speech training indicated that motion and color were fundamental needs in order for the student to visualize articulatory movements. The ability to control simultaneous audio would be desirable.

Random Access

Drill and practice techniques have proven effective for both Auditory and Speech therapy at NTID. The prototype system would be required to repeatedly play audio and visual stimuli. Video tape replay systems

appeared to meet this need though extensive modifications would have to be made.

Quick Rewind

Data indicates that waiting for reinforcement deteriorates learning. For this reason it was specified that a seven second stimuli must be replayable in three seconds or less. Drill and practice of short stimuli are common, particularly in Auditory therapy.

Individualization

The system must be capable of individualizing instruction to meet needs of students. The wide spectra of student needs being filled at NTID provided ample justification for this specification. Computer assisted instruction's capacity for diagnosis followed by instruction according to individual need appeared appropriate as one component of the system.

Active Learning (interaction)

Data suggests a strong correlation between active learning and instructional gains. Interaction with lesson material can occur in many ways. Computer assisted instruction provides interrogation, quizzing simulation, etc. The keyboard provides a means for the student to respond.

Data Gathering - Summary

To individualize a student's program, student data must be gathered. Based on this data, a specific program of instruction is provided. Periodically, data is gathered to determine that the initial prescription was correct. Lesson modifications are made immediately as needed. Research needs require data gathering at a different level. The capacity to identify each stimuli and when it occurred may be important. Each student's response, time to respond, etc., may be critical. These data must be collectable.

A combined instructional-research need was defined as maintaining current performance status on individual students as well as classes. For research purposes the ability to group students by various levels of handicap was desirable. These research needs affirmed the need for a mini computer, disks and a printer.

Portability

Concern for efficient use of time when the student comes to NTID prompted the need for portability. If, it was posed, this system was successful, it would become feasible to provide instruction as well as diagnostics for students in their home environment prior to moving on campus. Hours now spent in diagnostics at NTID would not be necessary, freeing time for career experiences. Some communication instruction (Speech-Audiology) could also begin prior to coming to campus. NTID's commitment to dissemination of curricula (as well as technology) appears to affirm the

need for protability as well as low cost.

Low Cost

The final criteria was that a low cost production model be feasible. This model would be for instructional use only. It would utilize existing lessons. No research or development capacities would be required.

Three system levels were defined:

A. Research model (research, development and instruction)

B. Development model (development and instruction)

C. Instructional model (instruction)

The system was designed in a modular form which supports expansion if needed. Special attention was paid to rentability, reliability and availability of service for the components of the system.

Video Disk Considerations

Detailed consideration of Video Disk technology was made. However, rejection occurred for two very strong reasons although its design appears to be ultimately the most compatible:

1. Availability, reliability and resolution of the picture negate its application at the present time.
2. Instructional development processes will require that tape masters be developed and tested (on a system of similar design as the research prototype) before mass production of video disks could occur.

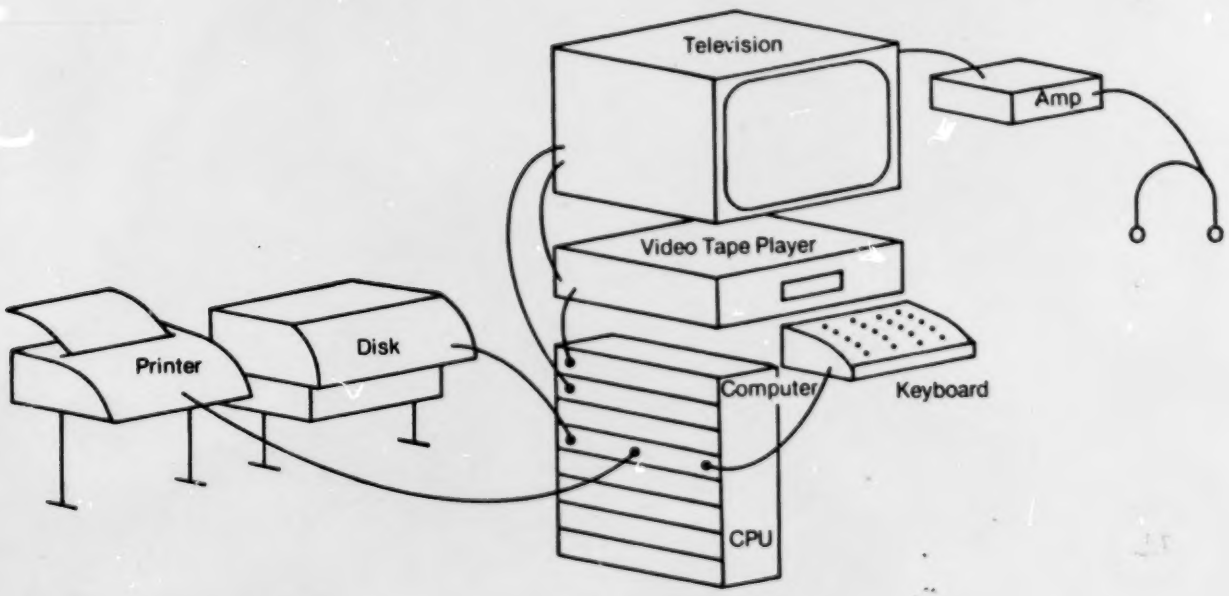
The conclusion was that it appeared that we should proceed utilizing state of the art equipment for the prototype. Experiences leading to success appear to be applicable for Video Disk technology.

Prototype System Assembled

The prototype is composed of the following parts:

1. Color television set (12")
2. Modified Industrial Video Tape Replay unit
3. Audio Amplifier
4. Micro computer
5. Keyboard
6. Mini Computer
7. Disk System
8. Printer

Interactive CAI/TV Prototype



Prototype testing

The first order of activity is to determine if the prototype will be able to function as designed. Similarly, it must be reliable and accurate enough to successfully function under educational use. No research can commence until the prototype has proven itself under use. At that time, we will be able to begin addressing research questions exploring the learning effect which may be the unique result of applying this instructional technology to Auditory training and Speech.

Conclusion

This system represents a synthesis of instructional television and computer assisted instruction. Creation of the prototype system will allow testing of both TV and interactive CAI/TV strategies in Auditory and Speech therapy. Its value must be proven as a useful, economically feasible, effective tool for the teacher of deaf. Much waits to be explored.

ABOUT THE AUTHOR

Dr. James R. vonFeldt serves the National Technical Institute for the Deaf as a specialist coordinating CAI activities. He supports faculty CAI training through a specially designed training process (SKILL) which is instrumental in CAI course development, evaluation and

research. He has designed and implemented new computer based instructional systems such as the CAI/TV system and has assisted many schools in implementing CAI to meet their needs. His education began at the University of Kansas followed by a master's degree (MS) from the University of Illinois and doctoral degree from the University of Missouri. His work experience spans civil engineering, education and computer technology prior to joining the National Technical Institute for the Deaf in 1971.